

U.S. Patent Application Serial No. 10/015,564
Amendment filed April 16, 2007
Reply to OA dated November 5, 2006

AMENDMENTS TO THE CLAIMS:

Please cancel claims 31-33 and 38-47 without prejudice or disclaimer, and add new claims 59-84, as follows. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 - 25 (Canceled)

Claim 26 (Previously Presented): A composition for coating having a gas barrier property comprising coating-forming components of an epoxy resin and an amine curing agent, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylendiamine and said amine curing agent is a reaction product obtained from reactants consisting essentially of the following (A), (B) and (C):

(A) metaxylylenediamine or paraxylylenediamine;

(B) polyfunctional compound of acrylic acid, methacrylic acid and/or derivative thereof, fumaric acid, maleic acid, malic acid, tartaric acid, isophthalic acid, terephthalic acid, pyromellitic acid, trimellitic acid or derivatives thereof, having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer;

(C) formic acid, acetic acid, propionic acid, butyric acid, lactic acid, glycolic acid, benzoic acid and/or derivative thereof.

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Claim 27 (Canceled)

Claim 28 (Previously Presented): The composition for coating according to claim 26, wherein said (B) polyfunctional compound is acrylic acid, methacrylic acid and/or derivative thereof.

Claim 29 (Canceled)

Claim 30 (Previously Presented): A coating comprising the composition for coating having a gas barrier property described in claim 26.

Claims 31 - 33 (Canceled)

Claim 34 (Previously Presented): A coated film having a gas barrier property comprising a gas barrier layer coated on at least one side of a flexible polymer film, wherein said gas barrier layer is a layer formed by cure of a composition for coating having a gas barrier property comprising coating-forming components of an epoxy resin and an amine curing agent, wherein said amine curing agent is a reaction product of the following (A), (B) and (C):

(A) metaxylylenediamine or paraxylylenediamine;

(B) polyfunctional compound having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer;

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(C) formic acid, acetic acid, propionic acid, butyric acid, lactic acid, glycolic acid, benzoic acid and/or derivative thereof.

Claim 35 (Previously Presented): The coated film according to claim 34, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylenediamine.

Claim 36 (Previously Presented): The coated film according to claim 34, wherein said (B) polyfunctional compound is acrylic acid moiety derived from metaxylylenediamine.

Claim 37 (Previously Presented): The coated film according to claim 34, wherein said flexible polymer film is polyolefin film, a polyester film or a polyamide film.

Claims 38 - 47 (Canceled)

Claim 48 (Previously Presented): A multilayered laminate having a gas barrier property comprising two outer layers (S_1) and (S_2) and at least one intermediate layer comprising at least one gas barrier layer (G) interposed between said two outer layers (S_1) and (S_2), wherein said gas barrier layer (G) is a layer formed by cure of a composition for coating having a gas barrier property comprising coating-forming components of an epoxy resin and an amine curing agent, wherein said amine curing agent is a reaction product of the following (A), (B) and (C):

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(A) metaxylylenediamine or paraxylylenediamine;

(B) polyfunctional compound having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer;

(C) formic acid, acetic acid, propionic acid, butyric acid, lactic acid, glycolic acid, benzoic acid and/or derivative thereof.

Claim 49 (Previously Presented): The multilayered laminated according to claim 48, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylenediamine.

Claim 50 (Previously Presented): The multilayered laminate according to claim 48, wherein said (B) polyfunctional compound is acrylic acid, methacrylic acid and/or derivative thereof.

Claim 51 (Previously Presented): The multilayered laminate according to claim 48, wherein each said outer layers (S_1) and (S_2) is flexible polymer film layer (F).

Claim 52 (Previously Presented): The multilayered laminate according to claim 51, wherein said flexible polymer film layer (F) is one film layer selected from the group consisting of a polyolefin film, a polyester film and a polyamide film.

Claim 53 (Previously Presented): The multilayered laminate according to claim 51, having

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flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F), flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) - gas barrier layer (G) - flexible polymer film layer (F), flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) - gas barrier layer (G) - metallic foil layer (M) - gas barrier layer (G) - flexible polymer film layer (F) or flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F).

Claim 54 (Previously Presented): The multilayered laminate according to claim 48, wherein said outer layer (S₁) is flexible polymer film layer (F) and said outer layer (S₂) is paper layer (P) or metallic foil layer (M).

Claim 55 (Previously Presented): The multilayered laminate according to claim 54, having flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P), flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M) or flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M) - gas barrier layer (G) - paper layer (P).

Claim 56 (Previously Presented): The multilayered laminate according to claim 48, wherein said outer layer (S₁) is paper layer (P) or metallic foil layer (M) and said outer layer (S₂) is paper layer (P) or metallic foil layer (M).

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Claim 57 (Previously Presented): The multilayered laminate according to claim 56, having paper layer (P) - gas barrier layer (G) - metallic foil layer (M) - paper layer (P) - gas barrier layer (G) - paper layer (P), metallic foil layer (M) - gas barrier layer (G) - metallic foil layer (M), paper layer (P) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M), paper layer (P) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) or metallic foil layer (M) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M).

Claim 58 (Previously Presented): The multilayered laminate according to claim 48, wherein said gas barrier layer (G) has an oxygen permeation factor of $0.2 \text{ cc} \cdot \text{mm/m}^2 \cdot \text{day} \cdot \text{atom}$ or below under the conditions of temperature 23°C and relative humidity 60%.

Claim 59 (New): A coated film having a gas barrier property comprising a gas barrier layer coated on at least one side of a flexible polymer film, wherein said gas barrier layer is a layer formed by cure of a composition for coating having a gas barrier property consisting essentially of coating-forming components of an epoxy resin and an amine curing agent, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylenediamine and said amine curing agent consists of a reaction product obtained from reactants consisting of the following (A) and (B) in a molar ratio $[(B)/(A)]$ of 0.3:1 to 0.95:1;
(A) metaxylylenediamine or paraxylylenediamine;

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(B) polyfunctional compound of acrylic acid, methacrylic acid and/or derivative thereof, fumaric acid, malic acid, tartaric acid, pyromellitic acid, trimellitic acid or derivatives thereof, having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer.

Claim 60 (New): The coated film according to claim 59, wherein said (B) polyfunctional compound is acrylic acid, methacrylic acid and/or derivative thereof.

Claim 61 (New): The coated film according to claim 59, wherein said flexible polymer is a polyolefin film, a polyester film or a polyamide film.

Claim 62 (New): A coated film having a gas barrier property comprising a gas barrier layer coated on at least one side of a flexible polymer film, wherein said gas barrier layer is a layer formed by cure of a composition for coating having a gas barrier property consisting essentially of coating-forming components of an epoxy resin and an amine curing agent, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylenediamine and said amine curing agent consists of a reaction product obtained from a mixture consisting of reactants consisting of the following (A) and (B) in a molar ratio [(B)/(A)] of 0.3:1 to 0.95:1 and a non-reactive solvent, a catalyst and/or a tertiary amine selected from the group consisting of pyridine, picoline, lutidine and trialkylamine;

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(A) metaxylylenediamine or paraxylylenediamine;

(B) polyfunctional compound of acrylic acid, methacrylic acid and/or derivative thereof, fumaric acid, malic acid, tartaric acid, pyromellitic acid, trimellitic acid or derivatives thereof, having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer.

Claim 63 (New): The coated film according to claim 62. wherein said (B) polyfunctional compound is acrylic acid, methacrylic acid and/or derivative thereof.

Claim 64 (New): The coated film according to claim 62, wherein said flexible polymer is a polyolefin film, a polyester film or a polyamide film.

Claim 65 (New): A multilayered laminate having a gas barrier property comprising two outer layers (S_1) and (S_2) and at least one intermediate layer comprising at least one gas barrier layer (G) interposed between said two outer layers (S_1) and (S_2), wherein said gas barrier layer (G) is a layer formed by cure of a composition for coating having a gas barrier property consisting essentially of coating-forming components of an epoxy resin and an amine curing agent, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylenediamine and said amine curing agent consists of a reaction product obtained from reactants consisting of the following (A) and (B) in a molar ratio [(B)/(A)] of 0.3:1 to 0.95:1;

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(A) metaxylylenediamine or paraxylylenediamine;

(B) polyfunctional compound of acrylic acid, methacrylic acid and/or derivative thereof, fumaric acid, malic acid, tartaric acid, pyromellitic acid, trimellitic acid or derivatives thereof, having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer.

Claim 66 (New): The multilayered laminate according to claim 65, wherein said (B) polyfunctional compound is acrylic acid, methacrylic acid and/or derivative thereof.

Claim 67 (New): The multilayered laminate according to claim 65, wherein each said outer layers (S_1) and (S_2) is flexible polymer film layer (F).

Claim 68 (New): The multilayered laminate according to claim 67, wherein said flexible polymer film layer (F) is one film layer selected from the group consisting of a polyolefin film, a polyester film and a polyamide film.

Claim 69 (New): The multilayered laminate according to claim 67, having flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F), flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) - gas barrier layer (G) - flexible polymer film layer (F), flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) - gas barrier layer (G) -

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metallic foil layer (M)- gas barrier layer (G) - flexible polymer film layer (F) or flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F).

Claim 70 (New): The multilayered laminate according to claim 65, wherein said outer layer (S₁) is flexible polymer film layer (F) and said outer layer (S₂) is paper layer (P) or metallic foil layer (M).

Claim 71 (New): The multilayered laminate according to claim 70, having flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P), flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M) or flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M) - gas barrier layer (G) - paper layer (P).

Claim 72 (New): The multilayered laminate according to claim 65, wherein said outer layer (S₁) is paper layer (P) or metallic foil layer (M) and said outer layer (S₂) is paper layer (P) or metallic foil layer (M).

Claim 73 (New): The multilayered laminate according to claim 72, having paper layer (P) - gas barrier layer (G) - metallic foil layer (M), paper layer (P) - gas barrier layer (G) - paper layer (P), metallic foil layer (M) - gas barrier layer (G) - metallic foil layer (M), paper layer (P) - gas barrier

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layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M), paper layer (P)-gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G)-paper layer (P) or metallic foil layer (M) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M).

Claim 74 (New): The multilayered laminate according to claim 65, wherein said gas barrier layer (G) has an oxygen permeation factor of $0.2 \text{ cc} \cdot \text{mm}/\text{m}^2 \cdot \text{day} \cdot \text{atm}$ or below under the conditions of temperature 23°C and relative humidity 60 %.

Claim 75 (New): A multilayered laminate having a gas barrier property comprising two outer layers (S_1) and (S_2) and at least one intermediate layer comprising at least one gas barrier layer (G) interposed between said two outer layers (S_1) and (S_2), wherein said gas barrier layer (G) is a layer formed by cure of a composition for coating having a gas barrier property consisting essentially of coating-forming components of an epoxy resin and an amine curing agent, wherein said epoxy resin is an epoxy resin with glycidylamine moiety derived from metaxylylendiamine and said amine curing agent consists of a reaction product obtained from a mixture consisting of reactants consisting of the following (A) and (B) in a molar ratio[(B)/(A)] of 0.3:1 to 0.95:1 and a non-reactive solvent, a catalyst and/or a tertiary amine selected from the group consisting of pyridine, picoline, lutidine and trialkylamine;

(A) metaxylylenediamine or paraxylylenediamine;

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(B) polyfunctional compound of acrylic acid, methacrylic acid and/or derivative thereof, fumaric acid, malic acid, tartaric acid, pyromellitic acid, trimellitic acid or derivatives thereof, having at least one acyl group which is capable of forming amide group moiety by reaction with a polyamine to form an oligomer.

Claim 76 (New): The multilayered laminate according to claim 75, wherein said (B) polyfunctional compound is acrylic acid, methacrylic acid and/or derivative thereof.

Claim 77 (New): The multilayered laminate according to claim 75, wherein each said outer layers (S_1) and (S_2) is flexible polymer film layer (F).

Claim 78 (New): The multilayered laminate according to claim 77, wherein said flexible polymer film layer (F) is one film layer selected from the group consisting of a polyolefin film, a polyester film and a polyamide film.

Claim 79 (New): The multilayered laminate according to claim 77, having flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F), flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) - gas barrier layer (G) - flexible polymer film layer (F), flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) - gas barrier layer (G) - metallic foil layer (M) - gas barrier layer (G) - flexible polymer film layer (F) or flexible polymer

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film layer (F) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - flexible polymer film layer (F).

Claim 80 (New): The multilayered laminate according to claim 75, wherein said outer layer (S₁) is flexible polymer film layer (F) and said outer layer (S₂) is paper layer (P) or metallic foil layer (M).

Claim 81 (New): The multilayered laminate according to claim 80, having flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P), flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M) or flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M) - gas barrier layer (G) - paper layer (P).

Claim 82 (New): The multilayered laminate according to claim 75, wherein said outer layer (S₁) is paper layer (P) or metallic foil layer (M) and said outer layer (S₂) is paper layer (P) or metallic foil layer (M).

Claim 83 (New): The multilayered laminate according to claim 82, having paper layer (P) - gas barrier layer (G) - metallic foil layer (M), paper layer (P) - gas barrier layer (G) - paper layer (P), metallic foil layer (M) - gas barrier layer (G) - metallic foil layer (M), paper layer (P) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - metallic foil layer (M), paper layer

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(P) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) - paper layer (P) or
metallic foil layer (M) - gas barrier layer (G) - flexible polymer film layer (F) - gas barrier layer (G) -
metallic foil layer (M).

Claim 84 (New): The multilayered laminate according to claim 75, wherein said gas barrier layer (G) has an oxygen permeation factor of $0.2 \text{ cc} \cdot \text{mm/m}^2 \cdot \text{day} \cdot \text{atm}$ or below under the conditions of temperature 23°C and relative humidity 60 %.